Light and Lighting

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The Seamen's Lighting Charter

THOSE who "go down to the sea in ships" may well be gratified that on New Year's Day there came into operation The Merchant Shipping (Crew Accommodation) Regulations, 1953—Statutory Instruments 1953 No. 1036. These Regulations, made by the Minister of Transport in exercise of powers conferred on him by the Merchant Shipping Acts of 1948 and 1952, apply—with certain exceptions—to every British ship for the time being registered in the United Kingdom before or after January 1, 1954, and to every ship being constructed (but not yet registered) to the order of a person qualified to be the owner of a British ship. The Regulations relate to many features of ships' accommodation which affect the comfort and welfare of the crew, and Regulation 11, which specifies conditions and standards of lighting, does credit to the Ministry for the recognition it shows of up-to-date views. Under this Regulation every part of the regularly occupied crew accommodation must have "proper" natural lighting—defined as that which is sufficient to enable an ordinary newspaper to be read by a person of normal vision at any point in the room which is available for free movement during the daytime and in clear weather. There must also be installed an electrical system capable of providing adequate lighting in every part of crew accommodation. The lights must be arranged to give the maximum benefit to the crew, and bed-head lights must be provided each emitting at least 200 lumens, or 400 lumens in a hospital ward. Some of the actual values of illumination specified for crew spaces are even higher than I.E.S. Code values for functionally similar spaces in building interiors. Well done!

Notes and News

The New Size

In our last issue we refrained from commenting on our new format but not because we were in any doubt about the result. It was none the less very pleasing to us that within an hour or two of the first copies being delivered on the morning of January 1 we were receiving telephone calls and telegrams of congratulation. We are neither fond of nor good at blowing our own trumpet, but we feel that these expressions of appreciation and good will deserve to be acknowledged, even though in so doing we might seem to be indulging in self-congratulation. To those who have thus encouraged us we say a sincere thank you.

One message we must print in full, that from the President of the I.E.S., Mr. W. R. Stevens, who, on behalf of the society, says: "In 1942, doffing its cap to wartime economy, *Light and Lighting* was reduced from a large-page size to the pocket shape with which we have now become familiar. Most of us objected, supporting our argument with prodigious calculation to show that the saving in paper was, in fact, negligible. But we were assured that the gesture of economy was as important as the economy itself.

"This happened so long ago that some readers, grown used to the handy little journal, might well be dubious about the overall advantage of increased size. If there were such doubts, however, they have not survived long for most of us. The new page permits the use of larger blocks and a more flexible layout: better quality paper also helps to give an appearance of 'having arrived' rather than being on the fringe of technical journalism.

"This change in make-up is the most impressive of many improvements to the journal which have been made in the last few years. The Illuminating Engineering Society, although it works closely and in harmony with the Illuminating Engineering Publishing Company, is not responsible for these improvements. It does, however, profit from them: and I am sure that all members of the Society would wish me to congratulate the Publishing Company and the editorial staff of *Light and Lighting* on this latest action which has given us a journal to be proud of."

At the time of writing it is still a little too early to have received many comments from our overseas readers, but we know that they will all be pleased by the change. Many readers have never been able to understand why the lighting industry of this country should be represented overseas by a pocket-size journal; nevertheless, in spite of our size during the last few years we have increased our overseas circulation so that *Light and Lighting* now goes to 44 overseas countries. Many readers may be surprised at this number; as we said above we are not very good at blowing our own trumpet and until we mentioned this fact casually to someone the other day we had ourselves rather taken it for granted. We look forward now to sending more copies overseas.

Dow Prize Competition

The conditions of the 1954 competition have now been made known. Once again the competition is intended to encourage collaboration between students of lighting and students of architecture; entries from individuals will not be excluded, but collaboration is advised. The winning entry will receive a total cash award of £75 and a certificate will be presented to each member of the winning team; certificates of commendation will also be awarded to any other entries of outstanding merit. Once again, in preparing the competition the I.E.S. has had the assistance of the R.I.B.A. and the I.E.E. The details are as follows:—

1. The subject for the 1954 competition is the lay-out, lighting, decoration and furnishing of a dining-room and cocktail bar in a city hotel.
2. Relevant documents with instructions as to the form which entries should take will be available on April 1; forms of application may now be obtained from the secretary of the Illuminating Engineering Society, 32, Victoria-street, London, S.W.1.
3. The competition is open to anyone who, not having completed his twenty-sixth year by the opening date (i.e., April 1), can show that he is taking, or has taken, a course of instruction, or has had equivalent training of a nature appropriate to the subject of the competition. All members of a team must comply with these conditions.
4. Candidates must have been born on or after April 1, 1928.
5. The last date for submission of entries is November 15, 1954.
6. Candidates may be required to give to the assessors a verbal explanation of their schemes.
7. In the event of there being no entry of sufficient merit, the award may be withheld.

8. The assessors' judgment of the entries will be final. In all other matters relating to the competition, the decision of the council of the I.E.S. shall be final.

In the first instance those wishing to enter should apply to the I.E.S. secretary, who will require certain brief details to ensure that each applicant complies with condition 3.

A few words on collaboration. Any student of illuminating engineeering who thinks he can win the prize unaided is likely to be disappointed; the same applies to the lone student of architecture. It may be helpful to recall the comments of the assessors for the 1952 competition (The Hon. Lionel Brett and Mr. R. O. Ackerley). Mr. Brett pointed out that those teams which did not include an architect had in general failed to notice the deliberately awkward architectural features which had been introduced; Mr. Ackerley pointed out that the entries which had been rejected by Mr. Brett had proved to be by teams which had not included an architect, whilst those which he had initially rejected had proved to be by teams without a lighting engineer. The point was well brought out that neither profession could do without the other. So remember—half a loaf is better than none. The names of the assessors for 1954 will not be announced until after the closing date; it is intended that the entries should be displayed and discussed, probably early in 1955.

Colour Rendering

There was a large attendance at a recent meeting of the Colour Group, when three papers on the colour rendering of fluorescent lamps were read and discussed. The first, by Mr. G. T. Winch and Miss B. M. Young, described the binocular viewing investigations which have been in progress at Wembley for some years. The authors pointed out the distinction between the *objective* definition of colour rendering by the spectral distribution of a source, and the *subjective* effect which could be greatly affected by circumstances, especially the way in which the observer's eye was conditioned both before and during observation.

Mr. Winch first summarised the progress that had been made on the objective side since the introduction of the " red ratio " in 1934, and he gave an account of the spectral band method and the various proposals that had been made by workers in this field. Finally, he described the binocular viewer used at Wembley for investigations on the subjective aspect of the problem. The actual method used for making the observations was described by Miss Young, who summarised the results that had been obtained, and showed chromaticity diagrams in which the point representing a given colour was seen to be shifted, often very considerably, due to conditioning of the observer's eye. Conditioning, in fact, produced quite a large measure of compensation in the case of sources with a smooth spectral distribution curve, so that the colours of objects were not as distorted as one would expect on purely objective considerations. With fluorescent lamps, however, compensation often did not take place to the same extent.

The second paper, by Dr. S. T. Henderson and Mr. D. T. Waigh, dealt with the basic principles involved in colour rendering and the difficulty of expressing it quantitatively. Dr. Henderson said that tolerances in the various spectral bands should not always be in both directions but should be positive only in some cases and negative only in others. Further, such tolerances were not suitable for a lamp designed rather to have a high efficiency than to provide good colour rendering. He described the " red rendering index " as applied to lamps intended for social purposes. This was the ratio of the emission of the lamp to that of a standard of comparison for a wave-length in the red part of the spectrum when the emission of both lamps was made equal at 560 mμ.

Dr. Henderson then dealt with " figures of merit " for the colour rendering properties of a source and described one based on contrast values. He also described the very complicated " duplication index " developed at the Bureau of Standards in America. His conclusions were that (a) a combined index figure was, generally speaking, of no value, (b) tolerances should generally be in one direction only so as to encourage the production of better lamps, and (c) the form of the specification applied to a lamp should depend on the uses for which the lamp was intended.

The third paper was by Dr. B. H. Crawford, who described an instrument he had designed to enable some assessment to be made of the differences which could be tolerated by the average observer before he noticed a change in the colours of objects. The principle was similar to that of the dispersion and mask photo-electric photometer. Light from a high intensity source was dispersed by a large prism and then masks could be inserted in the spectrum so that the intensity in any one or more of six spectral bands could be gradually diminished. The masked spectrum was then recombined and the resulting light illuminated any convenient coloured object or a picture. An illumination of up to 3.5 1m./ft.^{2} could be obtained over an area 10 in. square. The amount of reduction that could be made in any portion of the spectrum before the colour appearance of the picture became noticeably different gave a tolerance for the particular band of spectrum reduced.

Floodlighting for Football

The lighting engineer is a versatile creature, and there appears to be no limit to the number of jobs that he might be called upon to do. An addition to the list during recent years is that of lighting football grounds. Only a small proportion of the millions who follow football in this country may ever give a thought to the lighting engineer and his art, though we may be certain that every one of them has at some time or other discussed the subject of floodlit football and the relative merits of the different systems used at different grounds. The subject is also of topical interest to every lighting engineer, and we hope that the following pages, which contain views and comments by many well-known people in the field of sport and details of typical lighting installations, will not only be helpful to lighting engineers themselves but also to the officials of football clubs who have to take the decision and responsibility for installing floodlighting systems.

Introduction by Sir Stanley Rous, C.B.E., J.P.,

Secretary of the Football Association

At the end of last season the Football League sent a questionnaire about floodlighting pitches to all its 92 clubs. The answers showed that close on a quarter of these should be equipped with floodlighting in the near future. Quite a few clubs in the League have already adopted it, and others are considering doing so, though the high cost involved prevents many from installing a really good system.

The Football Association has done quite a lot to encourage the idea, and I think that there is now little doubt that floodlighting is here to stay. But as with other technical advances we should reflect upon its use with great care, and ask ourselves what are its real advantages? Is it the answer to the overcrowded fixture list? Can it obviate the need for early starts to winter games? How can it best benefit the player and the spectator?

We have not yet had enough experience to give final answers to these and similar questions, but a few points already emerge quite clearly. Its most obvious advantage is that it expands the time available for training, particularly for amateurs. It also allows mid-week fixtures to be played at a later hour when more spectators can attend. This means, too, that additional fixtures, like last season's Arsenal-Hibernian match, can be dovetailed into the normal programme—though here I should warn that many pitches already suffer from over-use.

Some advocates of floodlighting suggest that Saturday matches in mid-winter can be started at a later hour, the lights being switched on as darkness falls. But others, including Mr. Howarth, secretary of the Football League, do not consider this practical as the long English twilight gives rise to a period when it is difficult to see either with or without the aid of floodlights.

Another difficulty which is often forgotten by the keenest devotees of floodlighting is that as it gets darker it also gets considerably colder. It is amusing to note that in a country like the Argentine, where floodlighting is well established, this is considered an advantage—from December to March the days are so hot that games played under lights in the cool of the evening draw much larger attendances.

Our climate will unfortunately always prevent us from taking the fullest advantage of floodlighting. Apart from training, its use for matches is likely therefore to be largely limited to the weeks at the beginning and particularly the end of the season. This does enable matches which have to be postponed for various reasons to be played at times which will relieve the end-of-season congestion of the fixture list.

For this reason, if for no other, I think floodlighting is likely to become a permanent feature of English football, and will make those of us who are responsible for the administration of the game especially grateful to the members of the lighting industry who have helped to make it possible.

Views of a Team Manager

Discussing the subject of football ground floodlighting with our representative, **Mr. Tom Whittaker,** Manager of the Arsenal Football Club, said :—

The number of games which can be played at night in this country is limited to a certain extent by our weather and we find that there has to be a close season in the middle months of the winter. The purpose of the floodlit games is to attract spectators who cannot attend regular Saturday games and, apart from the risk of games being ruined by fog, mid-winter is not the time of year to attract people out of doors after dark. At present we play four or five games under floodlights each season.

There is no doubt that floodlit games are a great attraction; they are something new and we still have a lot to learn, but provided they are not abused their popularity should increase. To give an idea of the crowds they attract, at one game last season the gate receipts amounted to £11,000. There is no doubt that, both from the points of view of the club and the spectators, floodlit matches are a success and the capital cost of installation is a good investment.

The question of playing league games has been discussed from time to time, but again we are up against the weather; league games must follow a definite programme and the probability of fog would make this impossible. We also have the players to consider.

We started to experiment with lighting on the Arsenal ground before the war as we had played a number of games in other countries and thought we would try it ourselves. We had a number of practice games, but we could not raise any real enthusiasm. After the war, of course, we got down to it seriously and played our first game, against Glasgow Rangers at Highbury, on October 17, 1951. We designed the installation ourselves and as we gain more experience with it we make alterations to improve it. We think it is a good installation, but no doubt we shall further improve on it as time goes by.

The projectors at Highbury are arranged in line on the top of the stands on each side of the field. I think side lighting is the only way to get uniformity of lighting, but unfortunately only the few clubs who have two stands can adopt it. The best lighted stadium I have ever seen—the World Stadium at Rio de Janeiro—uses side lighting. Some people may think it desirable to have the same system on all grounds, but that just is not possible; the architecture and layout of grounds varies so much that what suits one may be quite impracticable at another.

What will need to be standardised in due course is the level of illumination on the field—with, of course, adequate precautions against glare. Such standardisation is hardly necessary at the moment, but it would certainly be required if league games are ever played at night.

It is hardly necessary to say that glare should be avoided, both from the point of view of the spectators and players. At Highbury the projectors are 55 ft. above the ground and we find them satisfactory—but again it is not every club that has stands that high. If the lamps are lower glare will be increased; also it would be more difficult to get uniformity of lighting on the field.

Many of the Arsenal team have played under floodlighting in this country and abroad and they like it; if anything floodlighting helps players to concentrate more on the game without any outside distractions. The

greatest critic in the game is usually the goalkeeper—if he is happy with the lighting then all is well. My only warning is that players should not be expected to play additional games at night just to augment club receipts; if this happens then floodlighting will not remain popular with players for very long.

I think experiments should be made to find out if the floodlights can be used to augment daylight. At present in mid-winter we have to kick-off as early as 2.10 p.m., but even then the light may be very bad before the end of the match. Perhaps we shall see the day when as daylight fails the referee will be able to call for the floodlights to be switched on. If this is practicable then we could start our mid-winter matches at a more convenient time.

As manager of a club my chief duty is to the first team; I therefore have to travel a lot and I rarely get a chance to see the second team in action which means that I cannot follow the progress of the younger players as well as I should like. The present practice is for the second team to play on the Saturday afternoons when the first team is playing away. I should like to see the second team games played at night during the week so that the executives of the club could give them more attention. This would apply to all clubs, not only to the Arsenal.

Finally I should say that at Highbury we have developed floodlighting with very little outside technical help. The subject is still in its infancy and we look to the lighting industry to develop it and to provide the best equipment for the job.

Views of a B.B.C. Television Commentator

By KENNETH WOLSTENHOLME

Although I don't expect to be awarded any prizes for it, I can probably claim to have seen more floodlit football in more places in Britain than most other reporters or followers of our great international game. My watching experience stretches from Highbury in the South to Falkirk in the North. It covers some floodlighting which is very good, some which is not so good, and a small amount which is, quite frankly, dreadful.

Most, but certainly not all, of my experience comes from commentating on the games which have been televised, and here I must admit that I view a floodlighting system on a different standard if I am doing a television commentary than if I am just watching as a reporter or spectator.

On television one is always wondering about the effect on the viewer. Is the lighting good enough to give him a good view? Can he follow the game, recognise the players, follow the ball?

Thirty thousand people sitting in the stands or standing on the terrace may think a floodlighting system wonderful, but the viewer at home may think it not so good, because the cameras are so sensitive that they will pick up and magnify any fault in the lighting just as a microphone magnifies any fault in the voice.

A shadowy patch to the naked eye becomes a black nothingness on television. A glare from a cluster of lights becomes, on the television screen, just a sea of light which shuts out any defined picture.

This can to a large extent be overcome by the placing of cameras in such a position that they will never, even for the most fleeting of seconds, point directly at the lights. But this means that if the lighting is installed on top of the stands running along each side of the field (as at Highbury) the cameras are safer behind one goal (as they are placed at Highbury).

That, however, is a problem for the television engineers and producers, not for the people installing the floodlighting, although I feel that the sensible club will always have one eye on television, which, despite the opposition from so many quarters, is certain to become a most important part of our lives.

The real problem of those installing the system is simply to provide enough light without glare, and as I am the world's most untechnical man, I have no idea whether or not that is a simple task!

As far as I can see, there are two main systems of floodlighting in use in Britain. One, the older one, is that which positions the lights along the length of the stands running parallel to the touchlines or has the lights on standards positioned at intervals along the touchlines.

The other system, which is being adopted by all the modern recruits to floodlighting, has the lights positioned on stanchions at each of the four corners of the ground.

Personally, I am not prepared to give an opinion as to which is the better idea. I am only prepared to say this . . . the best floodlighting I have seen is at Falkirk, the worst is at Newcastle United. Both these clubs use the same system, with lights positioned at intervals along the sidelines.

When we televised from Falkirk the pictures were classed by the critics as "reasonably good." To the

naked eye the vision was excellent, but our cameras were stationed at one end of the ground and there was, throughout the game, a steady drizzle.

Now drizzle, as any Mancunian will tell you, creates its own form of mist, and what could be worse for television than a mist? Without that drizzle-mist I am convinced that everyone who viewed that game from Falkirk would have been as impressed with the lighting as were all of us on the ground.

Newcastle United's floodlighting provides its own mist. From a seat in the main stand it is impossible to tell what is going on over on the far side.

As I said, I am not technically minded, but could it be that the "bad side" at St. James's Park is caused by its being uncovered terracing, backed by trees and then rows of houses? And could it be that the lights are not positioned high enough, so the angle at which they are placed causes a blurred effect to those viewing from the main stand?

Next to mist, whether caused by the weather or by bad floodlighting, the greatest drawback to soccer-by-night is shadow. At more than one ground I have visited the view seems excellent until you notice that there are shadows every now and then. They seem to appear in the gaps left by the lights not merging, and I have found those shadows only at grounds using the lights-in-clusters-at-each-corner system.

The effect is the same as the effect of driving along a road which is lit by those wretched lights which send out a thin beam and then plunge you into yards of inky blackness until you reach the next thin beam. (I wonder if our road safety experts have studied this problem?)

On the surface, floodlighting looks like a sea of light, but strangely enough, as soon as the game begins, it tends to become like spotlighting. The lights make the watcher follow the ball more closely than in normal daylight, so the result is that football played under lights looks faster and more skilful—what on earth would the Hungarians look like then!

This, of course, is a menace to the television commentator, who must always be looking for what is happening *off* the screen so that he may tell viewers what to expect—for instance, if the right-winger has the ball, it is interesting for the viewer to know that the centre-forward is racing down the middle for a pass.

But floodlighting makes you keep your eye on the ball, and it is a difficult job to tear yourself away from it!

So there are faults in some floodlighting, but they are small faults. Shadows, I am sure, can be eliminated. So can dazzle. Fog, smog and drizzle are problems way outside the terms of reference of lighting experts . . . or, it appears, any other sort of expert!

But watching so much floodlit football has convinced me of one thing. If it is intended to use the lighting for match purposes, a cheap system is a waste of money.

The lighting has to transform complete darkness (surely the best conditions for floodlighting) into complete light, and any cheap system is likely to have all the irritating faults of shadow, dazzle, distortion and blur. If a club wants to go in for floodlighting then it must go in for it properly.

And finally, I must admit to a fiendish sense of humour. I am eagerly awaiting the occasion when *all* the lights fuse at once during an exciting moment in the game. That would be fun!

Views of a Lighting Engineer

By N. C. SLATER

A new era is quickly developing in this country in connection with floodlighting for sporting activities at night, particularly for football. There are already a number of installations, each of which has been designed to suit the needs of its particular ground. At present there are three systems in use (a) the four corner system, (b) the multiple group system, and (c) the line system; each can be used successfully, depending on the contour and layout of the ground and the location and type of stand. The main factors to be considered, however, are (1) the provision of sufficient light for all conditions under which the games are played with special attention being given to the requirements of the spectators who want to see what they have paid for; (2) control of glare; and (3) the economics of the installation.

Quantity of Light

A football ground installation should be planned to give as near as possible equal average illumination throughout the playing area; with installations carried out to date the range of intensity varies in no uncertain manner. I feel that the sooner we can arrive at a standard code of practice the better it will be for all concerned; if this matter is not dealt with floodlit football could become a farce, especially with league clubs, professional and amateur, where the result of a game might be criticised because of the lighting conditions. When planning a job the engineer should, in the absence of a code of practice, approach the problem with the possibility of such a code in mind and advise his client that, while spending money on the initial scheme, he should also make provision for any future extensions which may be needed should such a code of practice come into being.

Glare

The all-important nuisance factor is glare, and this should be the first consideration of the lighting engineer, remembering that if floodlit football is to stay then the lighting engineer's work must be pleasing to the spectators; the spectator is out for pleasure and possible sources of irritation must be watched. If installations are not designed by specialists they are liable to fail in their purpose.

Mounting height and choice of fittings are of primary

importance. The installation should be designed so that spectators on all sides of the ground can follow the quick movements of the players and ball. Whilst so far floodlit games seem to encourage more ground play than in daylight games, engineers should cater for the ball rising to heights of 30 ft. or so. Shadows cast by players, dependent on the focusing of the lighting units, should also be considered.

Economics

Too many people are tackling the job from the angle of cheapness instead of from the point of view of efficiency and reliability. If a club is to spend money on a lighting installation it should obtain the right kind of advice right from the very beginning, as it is no good putting in a cheap installation with a limited life. Looking at it from the point of view of the installation engineer (who may continue his connection with the installation for many years, particularly if he deals with the maintenance) it means that the fittings should be robust and *waterproof* (not just weatherproof) even though such fittings may be more expensive initially; otherwise there is the danger of disintegration of the fittings within a short time, when the club will feel, quite rightly, that it had been badly advised in the first place. One should also consider, whether towers or stand mounting are used, the question of mechanical stress and strain, and prevailing weather conditions. In short—let the first cost be the last.

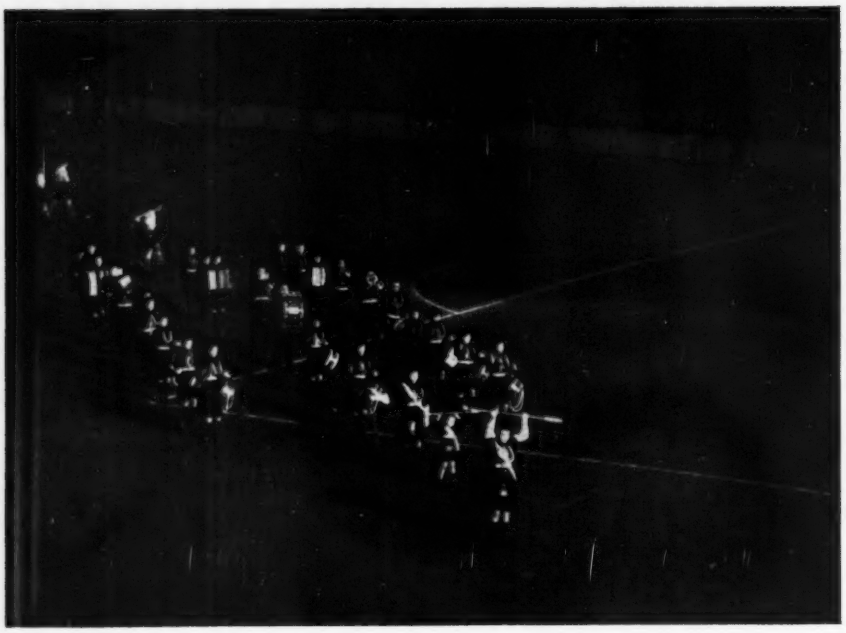
Control and Safety

Special care should be given to the control of the lighting from a central point, preferably from a control board within the main stand, incorporating indicator lamps in case switching has to be carried out in the dark. Whilst in most cases a three-phase system will be available, special care should be taken to cater for lamp failures during a match and to deal with switching before a game, during the game, and for the interval.

Safety is an important factor where one is concerned with such large crowds as those which attend football matches. It is evident that safety lighting should be from an independent supply. It should also be borne in mind that as floodlit football becomes more general the provision of adequate safety lighting may be laid down by regulation, just as it now is for theatres and cinemas. Outlay on such lighting now may mean a saving later on.

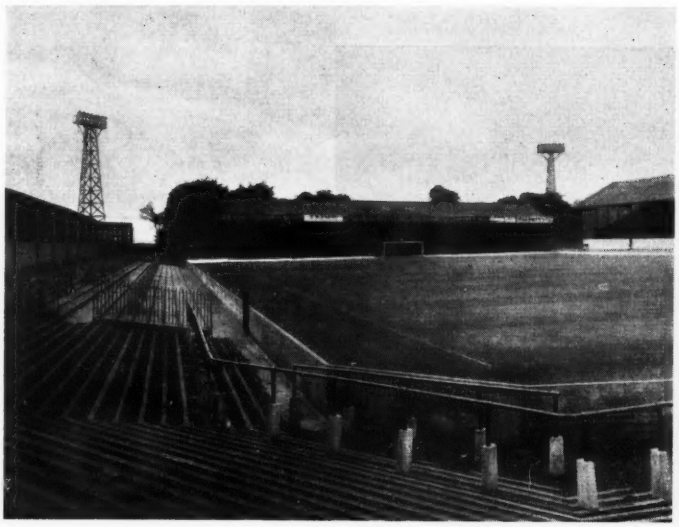
Presentation

What is a football match, or in fact any sporting event, but a performance by individuals for the entertainment of others; with this in mind one should look ahead with the idea of presenting a show with a punch. We could have plastic goal posts of suitable strength with lighting installed within the framework, these to be in colour to bring out the focal points of any match—the goals. Floodlighting of hoardings and neon signs within the arenas could also have possibilities; one can imagine people entering the ground with splashes of colour here and there, with only a dimly lit playing arena until the match starts, then off with the colour and up with the main lighting for the match. These things would tend to create an atmosphere for the show. We might even have linesmen with illuminated flags operated from batteries within the handle; these also could be quite easily made out of plastic. The whole idea behind this is a presentation with an extravaganza approach. These thoughts are perhaps looking ahead a little, but they certainly could have their uses.



". . . atmosphere for the show."

Installation at Bury F.C.



The lighting equipment consists of four groups each of 15 *Revo floodlights equipped with either* 1,000-*watt or* 1,500-*watt lamps.*

Notes by William H. Allen, Director of Bury Football Club.

"The system of lighting used is one of four towers erected at each corner of the ground at a distance of not more than 30 ft. from the playing area. The towers are 75 ft. high and the decision to use towers was prompted by the lowness of our stands which would have caused considerable glare. The fittings, 15 on each tower, are set on a 20-ft. channel girder in two rows of eight and seven.

Visibility was considered very good during the early period of October but was later affected by haze which caused certain dark patches accentuated by the turf which is rolled prior to each game and which gives a striped effect more obvious under artificial light.

Reaction from players was good although each goalkeeper did state slight difficulty was experienced in covering high balls when the flight of the ball met lamps which were focused in the goal area. Spectator reaction can be considered very good and generally the fact or illusion of greater speed is much to the liking of the supporters, many of whom cannot in the ordinary way attend normal league games owing to their occupations or difficulty in transport at peak periods.

The cost of the complete installation including amenity lighting (batteries) will be approximately £5,000 and we consider it necessary to have the services of a qualified electrician during the whole of the game in the event of faults, etc.

The average gate for our first four games, two of which can be considered minor events in the ordinary way, was an average of 14,000 which is 1,000 per match up on the ordinary league matches.

Maintenance as yet can be considered very slight and I cannot envisage a great amount of cost in this direction during the first five years. Cleaning of lamps prior to each game is necessary together with a general check over, but usually this can be done by members of the establishment.

I regard floodlighting as a great future potential, providing the clubs do not lapse into presenting games in the fashion of normal match routine; by this I mean each game should be presented with the teams wearing special luminous shirts and prefaced by good band music in order that a theatre atmosphere be created which will attract that whole family. Many games I have witnessed are drab affairs and simply a football match under lights. The success or failure of floodlighting therefore will be resolved by the following factors: competitive fixtures, weather conditions and colourful presentation."

Installation at Tottenham Hotspur F.C.

Notes by Arthur Rowe, Team Manager of The Spurs.

"We have adopted corner lighting with pylons each with 15 projectors in three rows of five. The result is satisfactory and the reaction of all concerned is good with no complaints of spectators of eyestrain. In our two matches so far we have had crowds of 30,000 for the match against the Racing Club de Paris and 37,000 for the match with Austria.

Running costs are estimated at approximately £15 per match; maintenance is by arrangement with the electrical contractors who installed the lighting.

My personal opinion is that floodlit football should be presented with a particular and different appeal than for ordinary league encounters and the appeal of such games will then be maintained, providing of course, that the number of matches is kept to a reasonable limit."

Four groups of 15 floodlights are mounted at each corner of the ground, carried on frameworks supported by 60 ft. concrete columns made to the order of the G.E.C. by Concrete Utilities Limited. The columns were cast on site behind the stands to avoid transport difficulties. The floodlights are of a type specially designed by the G.E.C. for applications of this kind. Eleven in each group have 1,500-watt projector lamps, and four have 1,000-watt projector lamps class B2. Plain mirrors in the 1,000-watt units give a long throw, reaching to the other end of the pitch. The 1,500-watt floodlights have rippled mirrors for a more diffused spread of light.

Installation at Luton Town F.C.

The Luton Town ground runs from east to west with a grandstand facing north and what is known as the "Bobbers Stand" facing south. Twenty-two Simplex Reflecto-floods have been placed at 16 ft. 6 in. intervals along the length of the "Bobbers Stand." On the grandstand side, 16 Reflecto-floods have been mounted on the stand itself and a further six on concrete pillars, two on each. All the fittings have been mounted at an approximate height of 40 ft. above the pitch. Each fitting is equipped with a 1,500-watt general service lamp. The illumination at the centre of the field is 4 lm./ft.^{2}; half-way between the centre and the touchline it is 5 lm./ft.^{2}; and in the area of the touchlines 8 lm./ft.^{2}

The floodlighting equipment is controlled by switched distribution boards, each switch controlling two floodlights, with the exception of the four corner floodlights which are independently switched so as to supply illumination for the dispersal of the crowds. General lighting inside the ground is supplied by four floodlights situated in the grandstand and one at each end of the two entrances. The floodlights on the "Bobbers Stand" are mounted on 2-in. steam tubing 21-ft. long. Lengths of steel 12 in. by 3 in. by $\frac{1}{2}$ in. are welded to the steam tubing and bolted to the wood facing and stand metal work.

Installation at Sunderland F.C.

Experiments with floodlit football had been tried out on the Sunderland F.C. ground with the aid of four groups of 15 flood-lighting projectors mounted on temporary towers, situated at each corner of the ground. It was decided in September last to make the installation a permanent one. The tubular welded towers were supplied by Tubewrights Ltd. These towers consist of a standard 60-ft. body, 7 ft. wide at the base, tapering to 2 ft. 6 in. at the top, built up of four corner tubes with diagonal tubular bracing; two towers have extensions giving a total platform height of 75 ft. The body is in four 15-ft. sections, connected together by flange and bolt connections on the main legs. Each section is easily hoisted into position, since the heaviest is less than half a ton in weight. The topmost section is provided with a circular support for the projection frame and maintenance platform. This support has a circular flat plate ring embodied in it.

The projector frame consists of vertical and horizontal tubular members welded together, the projectors being attached to the horizontal members in three rows of five. A platform and handrail is provided at the back of the projector frame for lamp maintenance. This platform is provided with a circular flat plate ring, corresponding with the ring in the tower body, which is drilled for fixing bolts. When the frame is hoisted into position on the top of the tower it can be rotated with respect to the tower body until the desired relation to the ground is obtained.

The lighting is provided by Holophane projector units which were developed to enable high peak beam intensities of 85,000 candelas to be provided by using 1,500-watt standard general service lamps for the main illumination for central play. Higher intensities of 110,000 candelas with 1,000-watt Class B2 projector lamps are used for the long-range lighting of the goal areas.

Installation at Glasgow Rangers F.C.

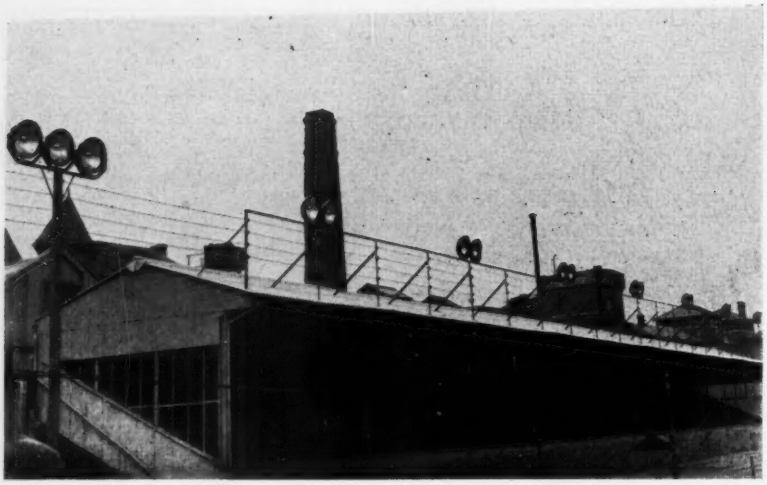
The method of lighting employed by Glasgow Rangers at Ibrox Park is a continuous line of floodlight projectors along each side of the ground, a total of 144 fittings being used. The floodlights are mounted at approximately 52 ft. above the level of the playing area on a specially constructed gantry which has been erected on the inside of the main stand. On the other side of the ground, known as the north enclosure, the fittings are mounted on temporary scaffolding to bring them in line with the floodlights on the opposite side. Some structural modifications are still to be carried out to make certain parts of the installation more permanent in nature.

The projectors used are Ediswan narrow-beam floodlights, each equipped with one 1,000-watt lightly frosted G.L.S. lamp and also with an interior-fitting multi-ring spill shield to reduce glare to players and spectators alike.

The method adopted was decided upon after extensive tests carried out over a period of 18 months by the club authorities in conjunction with the electrical contractors (Malcolm and Allan, Ltd.) and the Edison Swan Electric Co., Ltd.

When experiments first started with clear lamps filament striations were found to be insufferable and acid etching of the lamp bulb was tried with considerable success. The effect is that each floodlight now produces a greatly diffused beam which can be overlapped with its neighbouring floodlight to produce a smooth illumination on the playing area. The floodlight beams are interweaved as much as possible so that light is received on any given part of the playing area from many angles, with the result that a remarkable freedom from player shadow has been achieved.

Installation at Watford F.C.

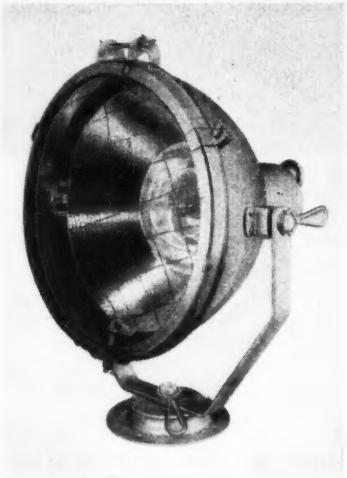


This is a recent installation, using for the first time a B.T.H. fitting designed to reduce glare to a minimum so that lower mounting heights may be used. Twenty-four of these fittings, each of which houses a 1,500-watt tungsten lamp, are mounted down each side of the pitch at regularly spaced intervals and at a comparatively low height. There are also two fittings placed to light each goal-mouth.

The main beam from the fitting is very wide and oval in shape thus enabling more light to be used in the playing area, on the ground and in the air. It also gives overlapping of the beams so that even if two or three lamps failed for any reason visibility would still be adequate. It is claimed that this fitting reduces the glare to about one-eighth of that from a standard floodlighting projector of the type normally used; even when fitted with a 1,500-watt tungsten lamp it can be looked at with less discomfort than when looking at a low sun on a winter afternoon, which every footballer and spectator has experienced.

The installation uses approximately 80 kw. of electricity.

Installation at Crystal Palace F.C.



This installation uses 84 *Philips "Winchester" floodlights, each equipped with a* 1,000-*watt class B*1 *lamp, mounted on eight* 65 *ft. towers, four on each side of the field.*

Installation at Gravesend and Northfleet F.C.

This installation, which was planned and supplied by Thorn Electrical Industries, Ltd., and installed by the South Eastern Electricity Board, comprises 28 reflectors —14 on each side—with 1,500-watt general service lamps mounted on poles at a height of 33 ft. above the ground level. Measured with a photometer the illumination ranges from 10 lm./ft.^{2} at the touchline to 3 lm./ft.^{2} at mid-field, but the drop in illumination is not so apparent as the figures would indicate either to the players or onlookers. As an additional touch of showmanship, a separate floodlight is beamed across the field on to the players' entrance, providing an illuminated path for the players before the main lighting is switched on.

Installation at Bristol City F.C.

Notes by Pat Beasley, Manager of Bristol City F.C.

At the Bristol City ground we have seven stanchions on each side of the ground, and one behind each goal which we can raise or lower whenever we wish —which is very convenient. Visibility is good and players can very easily follow the flight of the ball on the ground and up in the air.

All the officials of visiting clubs we have played are full of praise for our system, and so are referees, linesmen and spectators.

The cost of the installation was roughly £4,500; running costs are very little. Support from the public has been very good. Maintenance is mainly done by our own staff.

Floodlit football is a very good spectacle and a novelty, but played too much I think attendances would drop considerably.

Two Benjamin "Duoflux" 1,500-watt projectors are mounted on each of the double-headed pylons.

Conclusion

It is apparent from the foregoing articles and examples that there is no one system of lighting football grounds which can be applied to every job; as with other lighting applications, every job needs individual consideration. In some cases the question of side or tower lighting may be an easy one to answer—though the problem of providing the most suitable lighting for all concerned does not end there; in the majority of cases, however, the local conditions and circumstances need to be very carefully considered before advice can be given or a decision taken.

We invited a television commentator to contribute to this series of articles because a commentator must surely be one of the most critical observers of what is happening on the field of play and must therefore be one of the sternest critics of the seeing conditions provided. It is true that he has to worry about the technical problems of television itself—indeed the broadcast is of little use if the picture is distorted by lights within the angle of view of the camera. But he also has to watch every move in the game and cannot afford to lose sight of the ball for one second, whilst at the same time he must also know what is going on elsewhere on the field. The ordinary spectator, in spite of his enthusiasm, may not watch the game anything like as closely; he is unlikely to be at all concerned about the comfort or predicament of those watching the game at home, but lighting which gives good TV also provides good lighting for the spectator on the ground; the reverse is not necessarily true. Incidentally, though Mr. Wolstenholme may be "the world's most untechnical man," lighting engineers might remember that it is the untechnical people who have to be satisfied—they don't make the same allowances that the technically minded might.

The possibility of a code of practice has been raised. Such a code could give useful guidance on levels of illumination and on the avoidance of glare, and may indeed be most desirable, if not necessary, if League games are to be played at night. It may not be essential that all League clubs should have precisely the same type of lighting installation —it has already been shown that this is impossible—and reasonable variation must be permitted. Surely daylight conditions vary considerably, and no one questions the result of a game because the players happened to be playing into the sun. Sir Stanley Rous has expressed thanks to the lighting industry for making floodlit football possible; we can assure him that the industry is willing and anxious to help him and his colleagues as much as possible.

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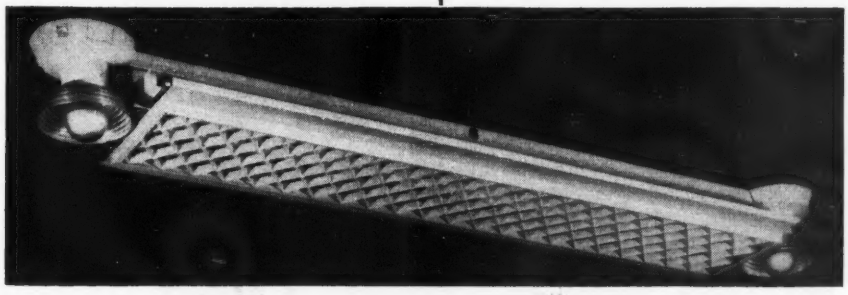
The Philips "Alfriston" fitting, with louvre, illustrated, is a lightweight twin lamp Industrial Channel Fitting for ceiling mounting in ivory stove enamel. An alternative one-lamp fitting is the "Ayr", without louvre.

PHILIPS



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A Traffic Island Bollard

By A. F. MAY, Assoc. I.E.E.

The percentage of accidents in Hong Kong caused through vehicles running into traffic islands has, in the past, been very high and 39 out of a total of 96 island beacons have been smashed beyond repair during 1952-53. On two occasions fatal accidents have occurred to pedestrians through a motorist losing complete control of his vehicle after crashing into a beacon. In the majority of cases the excuse given by the driver was that he had not seen the island or the beacon until it was too late; the authorities concluded as a result that the old pattern beacons were unsuitable.

From a study of the reports on these accidents the following points became apparent:—

(a) A beacon must be clearly seen at all times and must draw attention to its presence without diverting a motorist's attention from his driving.

(b) If accidentally hit a beacon must not break easily or cause a driver to lose control of his vehicle.

(c) Upon being knocked over a beacon must disconnect itself automatically from the supply, leaving no live wires or live casing as a potential source of danger.

(d) A smashed beacon presents a greater hazard than no beacon at all. It must, therefore, be constructed so that it can be quickly and easily replaced. To do this the base must be left undamaged and there must be no sheared-off threaded bolts to replace.

With the foregoing in mind the traffic island bollard beacon was designed, and the following is a description of its construction with reference to the photograph showing a T.I.B. beacon dismantled with the parts lettered.

The base (A), which is made of cast iron, is grouted in the island to within 2 in. of its top, no fixing lugs being required. Incorporated in the base is a cable end box on top of which is mounted the fuse-board (N) and the synchronous flashing unit (M).

The sheet-iron cover-plate (B) is inverted saucer shaped to shed rain should the pillar (D) be pushed off

Fig. 1. Component parts of bollard.

Fig. 2. Bollard on show at a Hong Kong safety first exhibition.

the base. Through holes in inverted cups in the cover protrude three rag bolts which extend upwards through holes in the bottom of the base. The rag ends, extending 3 in. below the base, take the strain which would otherwise be on the casting, and the base as a result can be made much lighter.

In the top end of the bolts there are holes with links to which are attached three springs (C) disposed at 120 deg. Each spring has a pull of 30 lb. when extended 3 in.

The cast-iron conical column (D) has ribs disposed at 120 deg. for added strength and the surface of the column evenly reflects light projected through the triangular "grid" (E), the female collar of which fits over the male collar on the top of the column (D).

A shear pin (F) which rests in locating grooves across the collar on the grid (E) holds a wire connecting the springs (C) to the shear pin (F); this wire is pulled taut by a screw jack (Q) which is a tool and not part of the assembly. The grid (E) and column (D) are held to the base (A) by the three springs (C) which have a combined tension of 90 lb. This spring fixing arrangement reduces the possibility of damage, and in the event of the beacon being hit by a glancing blow the springs give, and if the springs are not extended too far, the beacon will automatically right itself. If, however, the blow is direct and the springs are fully extended, the pin (F) will shear.

Upon the fuse board (N) is mounted a three-pin socket and plug with a perpendicular flex entry. The flex passes through a rubber-bushed hole in the centre of the cover plate (B). There is a cleat on the grid (E) under which the flex is placed, taking up the slack between it and the plug, and any excessive movement of the column upon the base will cause the plug to pull out and disconnect the beacon, making it dead.

The triangular head (G) has two windows (O) of opal "Perspex," and one window (P) with a transparent "Perspex" sheet, upon which is lacquered the lettering of the sign, backed by an opal sheet; the lettering being sandwiched between the two, is not affected by cleaning. All windows can be fitted with signs if necessary. The window panes are attached by clips spot-welded to the head.

Through the top of the head (G) protrudes a red well glass (H) with prism rings disposed around it. A rubber grummet (K) fits into the edge of the hole in the inverted saucer-shaped top, making a resilient watertight joint between it and the well glass (H). The two rubber washers (I) which are placed on either side of the flange on the well glass are held in place by the fixing ring (J); this ring is located on three bolts set at 120 deg. and welded to the interior of the head (G) and secured with three nuts. Upon the same three bolts is located the plate (L) holding the lamp holders, which hold three lamps set to illuminate the windows and the column evenly, and another lamp which is operated by the flasher (M) to illuminate the red well glass. To facilitate the changing of the lamp in the red well glass, the plate (L) is secured upon the three bolts already mentioned with three wing-nuts. The current supply is brought to the plate (L) via a plug and socket mounted on the plate, enabling the whole head (G) complete with plate (L) to be connected or disconnected with ease for maintenance without disturbing the flex, which, as a result, can also be kept quite short and out of the way.

The head (G) fits over the grid (E) and is attached with three eye-bolts which hinge on pins welded across the lower corners of (G). The eye-bolts have captive nuts which cannot be lost. The bolts fit into slots in the corners of (E) and the nuts are tightened with a key box spanner. Four of these new beacons have been tested in the busiest section of Hong Kong's capital city of Victoria and they have been found to be a great improvement on those hitherto in use, so much so that Government has ordered that 76 of the old pattern lights must be replaced as soon as possible by the new beacon.

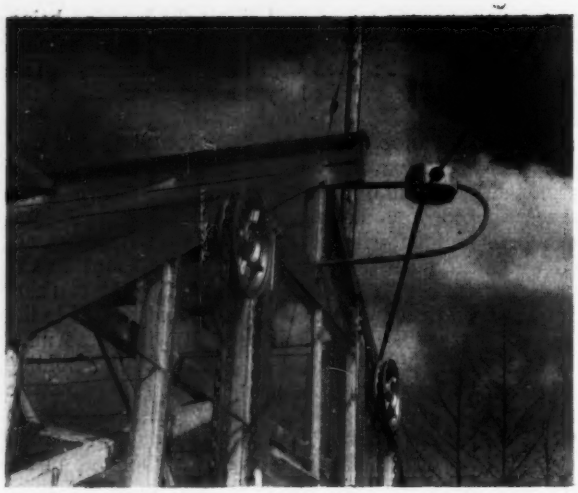
Artificial Lighting for Early Tomatoes

It is well known that plants respond both to the intensity of light and to the time during which they receive it. A technique for the application of high intensity light to tomato plants for the encouragement of early growth has been worked out by the John Innes Horticultural Institution and is described in their Leaflet No. 11 (see *Light and Lighting*, August, 1952, page 284). Briefly, it consists of subjecting the seedlings to an illumination of some 400 lumens per square foot for a period of three or four weeks before planting out. The light is applied from noon until midnight or from midnight until noon, care being taken to ensure that the plants have at least six hours of unbroken darkness each night.

If the lamps are movable, two batches of plants can be treated per day and thus the capital cost of the installation is reduced.

An installation carried out by the South-Eastern Electricity Board at Mr. Marshall's Deanlands Nursery, Vine's Cross, Sussex, has several interesting features.

The supply to the glasshouse (see Fig. 1) is by means of Enfield Grid Suspension cables (also used inside the house) to two 15-amp. plug points and to tungsten auxiliary lighting for use when the plant irradiators are being moved. For the illumination of the seedlings (see Fig. 2) seven high-pressure mercury vapour lamps in special G.E.C. fittings are hung from a rigid batten which is itself suspended from a rail of the type normally used for sliding doors. The control gear for each lamp is mounted on top of the fitting under a cover, a space being allowed between the insulated control gear base and the



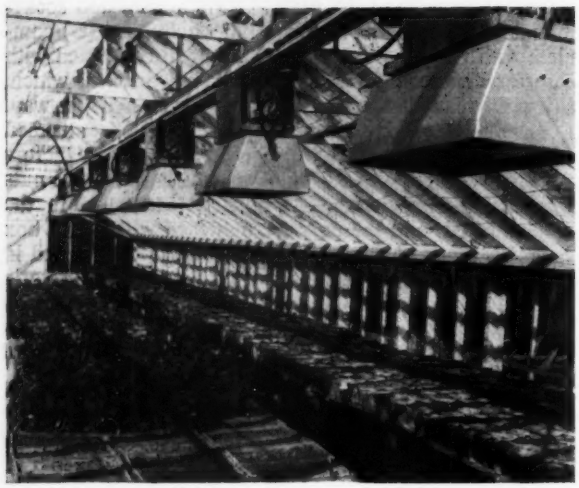


Fig. 1 (*Top*). *Electricity supply to glasshouse.*

metal top of the fitting. This arrangement keeps the control gear cool and its compact nature avoids interference with natural light. Each lamp is separately plugged and fused on the batten and accurate spacing is ensured as movement is effected by merely withdrawing a locking bolt and plug and sliding the whole concern to the other end of the house.

A batch of 2,400 plants was illuminated by the seven fittings described, the lamps being mounted 3½ feet above bench level and 4½ feet apart. After four weeks' treatment the plants were moved from the centre to side benches where they remained until required for planting out. Whilst another batch of plants received treatment those on the side benches obtained some benefit from light spilt from the centre bench.

The first batch of tomatoes was sown on October 30, 1952, pricked out into peat pots, irradiated from November 10 until December 19. The plants were put on the side benches until December 27 when they were planted.

First fruits were set on February 2, 1953, and on March 30 a consignment was sent to market. By the first week in April most local retailers were selling their first English tomatoes of the season. Last winter was considered to include the longest cold spell in living memory and this, combined with bad light due to fog, makes this a remarkable achievement, particularly since glasshouse temperatures were maintained at no more than their normal level.

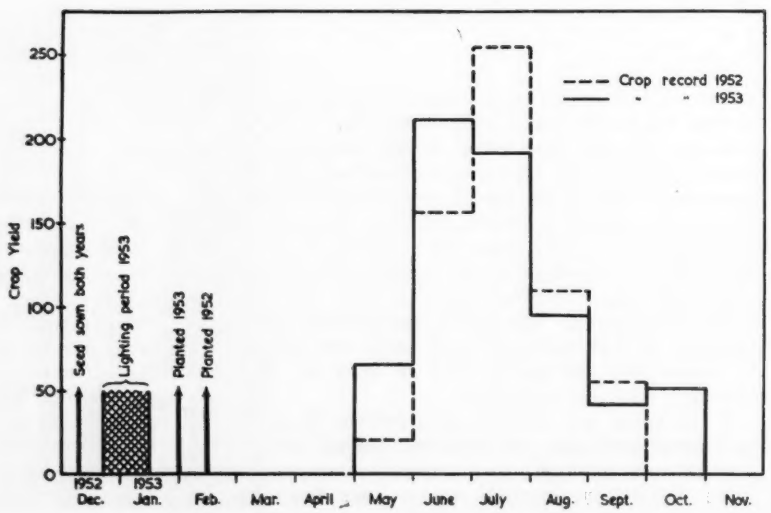
Succeeding batches were no less successful. The plants from seeds sown on December 10, 1952, were irradiated from December 20, 1952, until January 17, 1953, and planted out on January 31. This represented a saving in propagating time of 19 days with a consequent reduction of about 25 per cent. in solid fuel consumption during the depth of winter.

The effect of the lamps on the early crop is shown in Fig. 3. During May and June the amount of fruit picked was nearly 60 per cent. more than in 1952. The total crop shows a slight increase above last season in contrast to most growers' experiences which indicate a decrease compared with 1952.

Figs. 1 and 2 are reproduced by kind permission of "The Farmer and Stock-breeder."

Fig. 2 (*Centre*). *Interior of glasshouse.*

Fig. 3 (*Right*). *Showing effect of artificial lighting on early crop.*



Correspondence

'Luminaire'

To The Editor, LIGHT AND LIGHTING

Dear Sir,—In the January issue of *Light and Lighting* the editorial deals with the vexed question of what could be a satisfactory appellation of the complete lighting fitting, unit, etc., and various names are suggested. I must confess, however, that the proposed "Luminaire," which has been in existence for 30 years, fails to hold my interest, even though the English tongue has gone to so many sources for the continual additions that have been made to it.

I should like to suggest that consideration be given to the good old English word "Lantern" which has been in existence for many centuries and does, I feel, express what is required, i.e., the complete unit. Everybody is aware of what a lantern is and although some modern examples may not be exactly what is visualised when the word "Lantern" is mentioned, I think it is very much more expressive than the imported word "Luminaire." Again, I realise that "Lantern" is not a word of international status, but then neither are many of the other terms used in our craft.

I see it is your avowed intention to continue the use of the word "Luminaire," but I should at any rate like to make my protest before the new term becomes a household word, and I trust that I shall not be thought a "little Englander" by so doing.—Yours faithfully,

F. H. PULVERMACHER.

Pentyrch, Glam.

To the Editor, LIGHT AND LIGHTING

Dear Sir,—Your January issue could not have been better so far as we are concerned. You have given the "Luminaire" to the lighting engineer for his very own and—this is where we come in—your powerful support to a recommendation (made in the paper Specification and Testing of Fluorescent Lighting Fittings and Components, February 12, 1952), that the term "Luminaire" should be used to denote the complete lighting unit. The recommendation found little support at that time. These "sanitary" terms, "Fixtures," "Fittings," were too strongly entrenched.

G. FAHEY.
D. T. WAIGH.
W. R. BLOXSIDGE.

Thorn Electrical Industries, Ltd., Enfield.

Abbey Coronation Lighting

To the Editor, LIGHT AND LIGHTING

Dear Sir,—In connection with Mr. A. G. Penny's excellent article entitled "Random Review of 1953," in the January issue, we would make reference to certain aspects of the description of the Abbey Coronation lighting, which are liable to possible misinterpretation.

While Holophane were privileged to co-operate in the development and application of the lighting equipment, the engineers of the Ministry of Works were naturally responsible for the design of the installation, and it is our desire that such acknowledgment should be made.

We would also mention that the variation in lighting effects referred to in the article related solely to the nave of the Abbey, where full lighting was required only for the short periods of the procession. Any suggestion of stage effects had to be avoided, and it was therefore essential that no variation in lighting in the theatre of the Abbey took place during the ceremony, and that no part of that theatre was over-lighted. The lighting was so arranged that, no matter which part of the theatre was the focus for a particular phase of the ceremony, or in which direction the participants were facing, sufficient illumination was available for any of the four camera positions.

W. T. F. SOUTER,
Holophane, Ltd.

London.

Flameproof Fittings

To the Editor, LIGHT AND LIGHTING.

Dear Sir,—I feel that it is necessary to point out an inaccuracy which appears on Page 476 of the December issue of *Light and Lighting.*

The article in question is one by Mr. H. S. Allpress on the subject of Flameproof, Pressurised and Intrinsically Safe Lighting Equipment. The author infers that the registered "FLP" mark is issued by the authority of the British Standards Institution. In actual fact, this well-known mark is the property of the Ministry of Fuel and Power and its use is granted under licence for application to apparatus which has been certified by the Ministry.—Yours faithfully,

D. A. STRACHAN.

London.

A.-B. ORREFORS GLASBRUK

In our brochure "Orrefors Lighting Fixtures," published towards the end of 1948, it was stated on page 3 that we owned the patent and exclusive rights all over the world of so-called double-corrugated glass. This is not the fact, however, and we very much regret that owing to an oversight it was allowed to stand uncorrected in the brochure.

Through an agreement between Orrefors and Dr. Fredrik Kurz, Nysätravägen 12, Lidingö, Sweden, we have acquired the rights concerning double-corrugated glass in Sweden (Patent No. 123583), Denmark (Patent No. 73896), Norway (Patent No. 79554), and *Great Britain (Patent No. 563658)*, while Dr. Kurz owns the patent rights in all other countries. We are nevertheless entitled to export to all countries articles manufactured by Orrefors which fall under the protection—technical but not territorial—of this patent.

We confirm at the same time we do not own any rights whatever concerning Dr. Kurz' other patents.

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Good lighting pays dividends. In shops and stores it attracts more customers; in workrooms and factories it leads to better work and higher output. Siemens produce all the lamps and fittings necessary for scientifically planned lighting. If you want incandescent lamps and fittings Siemens can supply them all. If you need fluorescent lamps in any colour, size and rating, with the fittings to go with them, Siemens can supply these too. And, in both sections, you will find that Siemens fittings will harmonize with every kind of decorative scheme.

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REVIEWS OF BOOKS

"The Year that Made the Day." 79 pp. with many illustrations. The British Broadcasting Corporation. Price 6s.

This little book is about how the B.B.C. planned and prepared the Coronation Day broadcasts. On June 2 the B.B.C. services enabled millions of people throughout the world to take part in the Abbey ceremony and in the rejoicings in the Capital. Those of us who are technically minded must long ago have appreciated the enormous amount of planning which made possible broadcasts in 41 languages in addition to English. For television it was the biggest outside broadcast ever; and 20 minutes before the television programme was due to begin there was a complete breakdown on sound—a moment described in the book as "tense."

There is no mention of the lighting which made television of the Abbey ceremony possible—but readers of this journal have already read of that. The book is well worth six shillings. G. C.

Technische-wissenschaftliche Abhandlungen der Osram-Gesellschaft [Technical and Scientific Papers of the German Osram Company], Volume 6. Pp. 220+viii; figs. 169. Springer-Verlag, Berlin, 1953.

This volume contains digests or reprints of papers published in various journals by members of the research staff of the German Osram Company and a large number of papers by them which have not been published elsewhere. The period covered is 1943 to 1952, although some earlier papers which did not appear in Vol. 5 have also been included. In all there are 42 papers on subjects coming within the range of interest of the Company, i.e., lamps and the production of light, photometry, colour, the properties of glass and, finally, metallurgy. Among the authors' names there are several which will be very familiar to lighting engineers in this country. It is not clear whether the book can be purchased in the ordinary way, but it seems to have been distributed widely to scientific and technical libraries in this country, including the library of the Illuminating Engineering Society. The production is excellent and the volume is a very useful addition to the scientific literature dealing with matters of close interest to all concerned with lamps and light production. J. W. T. W.

"Further Advice on Stage Lighting." 90 pp. with 50 illustrations and 6 line diagrams. The Strand Electric and Engineering Co., Ltd., London. Price 2s. 6d.

This is a revised and enlarged edition of an earlier publication and is intended for those concerned with amateur productions. It is divided into two parts—choosing the equipment and using the equipment; it deals with lamps, lighting equipment, electricity supply and control, colour and special effects. Its 90 pages are well packed with information which is presented in a most readable form; it is the sort of thing a harassed amateur producer or electrician can read and take in without undue strain. G. C.

Trade Literature

J. A. CRABTREE & CO., LTD.—Leaflet, No. 1152, giving illustrations and details of a new type of flush tumbler switch which has recently been developed called the new 5 amp "Lincoln" type A.C. switch. A price list is also included.

THE EDISON SWAN ELECTRIC CO., LTD.—A folder illustrating some new additions to the Ediswan Harcourt range of commercial and decorative lighting fittings. Prices are given with each fitting.

THE GENERAL ELECTRIC CO., LTD.—Two catalogues, one of decorative and one of commercial lighting fittings, which are to be known as the "basic range." These fittings will be carried in stock by all the Company's branches and so available for immediate delivery. The catalogues are clearly illustrated and priced.

NIFE BATTERIES.—Four publications illustrating various types of "Nife-Neverfayle" emergency lighting units with steel-alkaline batteries. No. 1653—non-maintained; No. 1553—maintained; No. 1753—floating and No. 1453 includes switch relays and contactors.

PHILIPS ELECTRICAL LTD.—A new booklet entitled "Infra-Red Warming for Animals." Generously illustrated dealing in detail with the special heat needs of different types of young animals including helpful recommendations.

CLARKE, CHAPMAN & CO., LTD.—Leaflet, No. 115, devoted to floodlight equipment for football and sports grounds with illustrations.

Personal

MR. F. L. CATOR, who for the past five years has been in charge of the Lighting Dept. of the B.T.H. (S.A.) Pty. Ltd. in Johannesburg, has now joined the staff of Hubert Davies and Co., Ltd., the mechanical, electrical and civil engineers in Johannesburg. Mr. Cator has also become the first chairman of the new I.E.S. Transvaal Group.

Further to the notes in a previous issue on personnel changes in the Dept. of Labour and National Service of Australia we would add that MR. J. C. LOWSON is the Senior Lighting Engineer at the Melbourne Central Office of the Department.

MR. H. O. SAMPSON, who was Senior Lighting Engineer of the B.B.C. Television Service until 1952 when he was appointed Assistant Head of Technical Operations Television Studios, has now been made Head of that section of the B.B.C.

MR. R. C. PENNINGTON, lately chief lighting engineer with Courtaulds, joined Harris and Sheldon (Electrical), Ltd., on January 1.

MR. C. W. COSGROVE has been appointed to succeed MR. E. R. GANT, now retired, as general manager of the Osram-G.E.C. group of factories.

Stella Lamp Co., Ltd., announce the appointment of MR. J. BIGGS and MR. K. V. ISSOTT as their representatives in Lancashire and Yorkshire respectively.

SITUATION VACANT

Ekco-Ensign Electric, Ltd., have vacancy in the Illuminating Engineering Department for young man who has completed National Service. He should have received a good general education and have some electrical knowledge and a desire to enter the lamp and lighting industry. Please apply in writing to Chief Engineer, Ekco-Ensign Electric, Ltd., 45, Essex-street, London, W.C.2.

Lighting Abstracts

LAMPS AND FITTINGS

621.329

10. Comparative rating guide for fluorescent lighting fixtures.

L. V. JAMES. *Illum. Engng.*, **48**, 539-555 (*Oct.*, 1953).

To facilitate the bulk purchase of fluorescent fittings by competitive tender a guide has been devised whereby different quotations can be rated and compared. The principle of the schedule is the determination of a "weighted relative cost" for each quotation. This cost is given by the annual cost of lighting a typical room weighted by the average illumination and by a rating factor based on electrical and mechanical considerations and on the quality of the resultant lighting. P. P.

621.327.42

11. Cold cathode ballasts.

R. C. HULTGREN. *Illum. Engng.*, **48**, 574-577 (*Nov.*, 1953).

Ballasts and circuits for cold cathode fluorescent lamps are described which allow for the negative resistance characteristic of this type of lamp and the increase in lamp voltage during life. The wattage losses in the combination of ballast and lamps are found to be reduced to a minimum when four lamps are operated together from a special type of mid-point cut-out ballast. An overall efficiency of 47 l.p.w. is then obtained. P. P.

621.327.43

12. Electrical characteristics of lamps and ballasts.

W. C. GUNGLE. *Illum. Engng.*, **48**, 579-583 (*Nov.*, 1953).

The three principal methods for starting fluorescent lamps are first reviewed. The electrical characteristics of a circuit comprising two 40-watt lamps operating from a "rapid-start" ballast (i.e., cathodes continuously heated) are then considered in greater detail. The increases in lamp voltage necessary to develop sufficient cathode emission to start the lamps when one or more of the cathodes are unheated are given. The effect on the lamp starting characteristics of contact resistance in the heater circuits is also discussed.

P. P.

628.971

13. Road furniture.

Int. Ltg. Rev. 1952/53, **5**, 27-31.

A review of the various types of lighted or reflecting road signs and guides used in Britain and on the Continent. Traffic signals fall into two main groups—light signals such as stop lights, and traffic signs such as direction posts and indicators. The great variety of the latter is shown by illustrations from various countries. Description and brief constructional data are given for many types of designs.

W. R.

LIGHTING

628.383

14. Street lighting photocell control calibration cabinet.

W. N. LINDBLAD AND L. C. EDWARDS. *Illum. Engng.*, **48**, 509-512 (*Oct.*, 1953).

In order to check and adjust the operation of light-actuated switch units for street lighting a special calibration cabinet has been devised. The photocells in the units are exposed in the cabinet to levels of illumination pre-set to represent conditions under which the switching mechanism should function when properly adjusted. The operation of the switches is indicated by a small lamp plugged into the switching circuit to stimulate a street lamp. P. P.

628.93

15. Practical applications of studies in inter-reflection.

J. DOURGNON AND R. CADIERGUES. *Bull. Soc. Franc. Elect.* (*Sér.* 7), **3**, 536-548 (*Sept.*, 1953). *In French.*

In Part I Dourgnon discusses the various methods and approximations proposed for the calculation of inter-reflection, including the various schemes suggested for the room index; he also discusses, with numerical examples, changes of colours due to inter-reflection.

In Part II Cadiergues rehearses attempts made by several workers to explain a defect alleged to be associated with fluorescent lighting. Ultra-violet radiation, flicker—including effects thought to be revealed by the electroencephalograph—and reduction of visual acuity were in turn found to have negligible effects. He was led to study brightness distributions and outlines a possible method of calculation of inter-reflections. An interesting result is reported concerning glare. J. M. W.

628.97

16. Reduction of light in service.

D. FISCHER. *Elektrotechn. Zeits.* (*B*), **5**, 293-297 (*Sept.* 21, 1953). *In German.*

The illumination obtained from any lighting installation gradually diminishes during service. Chief causes of this are the ageing of the lamps, outages, the dirtying of lamps and fittings, deterioration of the room decoration, voltage variations and low ambient temperature (in the case of fluorescent lamps). The author considers each of these factors in turn and in connection with outages he discusses the economics of group replacement where the replacement of individual lamps is costly. He gives an account of an investigation by J. Jansen (published in the International Lighting Review) on the loss of light due to dirt on lamps and fittings. A number of different values have been suggested for the "maintenance factor" and these are considered in the final part of the paper. J. W. T. W.

628.971.6

17. Street lighting and traffic.

W. SINN. *Elektrotechn. Zeits.* (*B*), **5**, 290-202 (*Sept.* 21, 1953). *In German.*

The author refers to American research on the relation between street lighting and traffic accidents. A high percentage of accidents are due to failure to see, for one reason or another. The street lighting must be regarded as a tool, made use of by the driver to enable him to detect objects. Reaction time and "shock period" differ from one individual to another and depend on circumstances, but their importance is much reduced where everything is clearly visible. The nervous strain of driving is reduced by good street lighting and the glare from approaching vehicles is diminished. J. W. T. W.

628.972

18. Survey of modern interior lighting.

E. REBSKE AND L. WEIS. *Elektrotechn. Zeits.* (*B*), **5**, 285-290 (*Sept.* 21, 1953). *In German.*

The publication of the new German Code for interior lighting (see *Light and Lighting*, December, 1953) is the occasion for a survey of modern methods with particular reference to the widespread use of fluorescent lamps. The authors deal in turn with industrial premises, offices, shops and shop windows, large halls and the like, and with home lighting. In each case the particular problems encountered are mentioned and an illustration of a good modern installation is given. J. W. T. W.

19. Development of lighting for operating tables. 628.972

F. GUNTHER. *Lichttechnik*, **5**, 300-302 (*Sept.*, 1953). *In German.*

The author traces the progress made in the lighting of operating tables, from the use of a remote carbon arc with a system of mirrors, to the enclosed fitting with a band lens and paraboloid mirror system. He then describes the type of fitting in which a circular dome houses eight small projector fittings arranged on a circle 80 cm. in diameter. The illuminated area is some 20 cm. across and the illumination 1,200 to 1,500 lm./ft.^{2}. The heat is reduced by using a layer of heat-absorbing glass which also makes the colour of the light similar to daylight. Arrangements can be made to take colour photographs and to project the operating area on to a screen in a separate room for teaching purposes. J. W. T. W.

20. Lighting of large river bridges. 628.971.6

W. KOHLER. *Lichttechnik*, **5**, 331-333 (*Oct.*, 1953). *In German.*

The new road bridge at Worms, replacing the old Nibelungen bridge, is lighted by fittings, each housing three 4-ft. 40-watt fluorescent lamps, and mounted on slender steel columns placed on the balustrades. The columns are bent over at the top so that the fittings are horizontal and over the kerbs. The mounting height is nearly 20 ft. and the spacing 100 ft. The total width between balustrades is 44 ft. A good deal of information is given about the illumination produced, but none about the luminance distribution, although a night photograph under rainy conditions shows a very uniform road surface brightness. One lamp in each fitting is extinguished at 10 p.m. J. W. T. W.

21. Technique for explosion-proof lighting. 628.972

J. M. ADAMS. *Illum. Engng.*, **48**, 506-508 (*Oct.*, 1953).

In relighting a distilling plant classified as a hazardous location, a method of explosion-proof lighting has been adopted which takes advantage of existing clerestory windows. Twenty-four 500-watt reflector lamps were mounted outside the building concerned and were directed through the windows on to the opposite walls. The resultant working plane illumination was found to vary between 10 to 17 lm./ft.^{2}. Factors affecting the design of the installation are discussed. P. P.

22. Screening fluorescent lamps with louvres. 628.972

Int. Ltg. Rev., 1952/53, **5**, 22-25

This article reviews broadly the development of Louvres and louvred ceilings from 1940 to the present day. The various types and shapes of louvre are discussed and photometric data is given relating to these and to the materials used in their construction. Reference is made to the constant cut-off (hyperbolic) type of louvre and to the problem of static with plastic louvres. Ease of installation and maintenance of independent louvre systems is considered to be of great importance and reference is made to the practice of an American manufacturer in this connection. The article is copiously illustrated. W. R.

628.93

23. Interflectance tables from conventional photometric data.

L. E. INNIS. *Illum. Engng.*, **48**, 595-609 (*Nov.*, 1953).

The interflection method of Moon and Spencer has been used to produce tables of interflectance values relating to 10 types of flux distribution representative of fittings having polar diagrams conforming with the C.I.E. classifications. From these values it is possible for manufacturers to calculate coefficients of utilisation for their fittings merely by multiplying by the fitting efficiency. This is a considerable simplification over previous applications of the interflection method to this problem which necessitated special photometric data being obtained for the purpose. P. P.

24. Direct lighting for schools. 628.972

H. L. LOGAN. *Illum. Engng.*, **48**, 568-571 (*Nov.*, 1953).

Reference is made to recent researches on discomfort glare and to new designs of direct-lighting fittings which enable comfortable lighting conditions to be produced in schools without the need for a strict compliance with the limiting brightness ratios specified in the American Recommended Practice for School Lighting. Two installations employing different types of lighting are examined and the Logan-Lange Comfort Factor is used to evaluate their degree of visual comfort. P. P.

628.96

25. Efficiency and appearance factors in luminous panels.

M. E. HASKINS, JR. *Illum. Engng.*, **48**, 587-591 (*Nov.*, 1953).

Describes photometric measurements and subjective appraisals made on a test set-up to determine the efficiency and appearance of luminous panels comprising diffusing corrugated plastic sheet trans-illuminated by fluorescent lamps. The mean luminances and luminance contrasts of the panels are first related to a scale of acceptability of appearance. This scale is then combined with data relating the luminous efficiency of the panels, the light transmission of the plastic material and the relative spacing between adjacent lamps and the surface of the panel. P. P.

628.971.6

26. Should fittings with fluorescent lamps be suspended along or at right angles to a street?

H. GROHER. *Lichttechnik*, **5**, 371-372 (*Nov.*, 1953). *In German.*

The rapid growth of fluorescent street lighting in Germany has led to much discussion regarding the most advantageous way of arranging the fittings. Some advocate a longitudinal system for certain reasons, others prefer a transverse system, frequently for different reasons. The author lists 10 desirable qualities in a street-lighting system and indicates in a table by + or − signs which of the two arrangements possesses each of these various qualities. The table is amplified by a lengthy commentary. J. W. T. W.

628.972

27. Illumination of copying rooms with yellow fluorescent lamps.

W. BARTHOLOMEYCZYK AND H. GOCKERITZ. *Lichttechnik*, **5**, 370 (*Nov.*, 1953). *In German.*

There is a yellow fluorescent lamp now on the market which, when used with a yellow glass cover to absorb the blue and violet mercury emission, gives no radiation at wave-lengths below 500mμ. The sensitivity curve of the bichromate emulsion used in various photographic copying processes does not extend beyond about 480mμ. It follows that this light is a "safe" light for use in copying rooms and that quite a good illumination may be provided without any effect whatever on the sensitive material. J. W. T. W.

628.972

28. Constructional and lighting characteristics of luminous ceilings.

D. FISCHER. *Lichttechnik*, **5**, 401-402 (*Dec.*, 1953). *In German.*

The author expresses the utilisation factor for a luminous ceiling installation in terms of a "room co-efficient" $K_r = h\,(l + b)/2lb$, where h, l, and b are respectively the height, length and breadth of the room. He then lays down guiding rules for the design of the installation, with particular reference to the dimensions of the overspace, its reflection factor and freedom from obstruction, and to the spacing of the lamps. Referring to typical installations he describes the characteristics of the lighting produced and concludes by emphasising the necessity for designing for ease of maintenance J. W. T. W.

Lighting Installation

A Television Assembly Line

General Information

The production of a television receiver is largely an assembly process in which well over 1,000 parts are joined together by small nuts and bolts self-tapping screws and soldered joints. In the new Ferguson plant more than 10 miles of cut wire are used and more than 500,000 soldered joints are made daily, and each operator has about two minutes in which to perform her allotted task. High-level lighting, free from shadows and specular reflections, is therefore required, and the siting of luminaires has to be studied in relation to overhead conveyor runs, heating pipes, cables, etc. Many of the small resistances and capacitors, some of which are less than 1 in. long and about $\frac{1}{8}$ in. in diameter, are identified by colour coding bands, so that colour discrimination was an important factor in the design of the lighting installation. The assembly line described here is only part of the factory, the whole of which has been re-lighted to a similar standard.

The Installation

The four main assembly lines consist of slowly moving conveyor belts passing the chassis before a series of girl operators, each of whom inserts one or more small components, fixing it either by screws or by soldered connections. For the most part the chassis is supported by a tilted rack frame, the angle of which is adjusted to avoid specular reflection from the continuous line of single-tube luminaires overhead. Although this section of the factory has north-sky roof lights the illumination on the working plane is provided almost entirely by the artificial lighting. The luminaires are mounted 4 ft. 6 in. above bench level (8 ft. above the floor) and give 60 lm./ft.^{2} on the horizontal bench surface and not less than 35 lm./ft.^{2} on the tilted frames.

Each conveyor belt is lighted by 27 luminaires fitted with 5-ft. 80-watt "Atlas" white lamps. The luminaires permit a proportion of upward light to be reflected on to the ceiling and roof trusses, which are painted pale green; all overhead services are painted aluminium and the "tunnel" effect is avoided.

Designed and installed by :—Thorn Electrical Industries, Ltd.

I.E.S. Activities

London

The paper entitled "Studies in Interior Lighting" presented by Mr. J. M. Waldram at the London meeting on January 12 is a contribution to the study of interior lighting discussed in the Report of the Sub-Committee of the British National Illumination Committee published recently in the I.E.S. Transactions under the title "The Design of the Visual Field." It concentrates on three problems: adaptation and apparent brightness; the revealing of form and texture; and emphasis. The first two of these are treated quantitatively and in some detail. The paper includes a new approach to the problem of interreflection and shows how installations can be designed to a given specification of apparent brightness, taking interreflection properly into account, by quite simple means.

It is shown that in many situations values of luminance are quite anomalous as judged by visual impressions. It has, however, been found that a scale of "apparent brightness," first derived by Hopkinson, which takes into account the effects of adaptation, results in reasonably consistent numbers which link together experience in many different situations, ranging from full daylight outdoors to street lighting, and resolves the anomalies. A tentative interpretation of the scale is given. It appears from the curves defining the scale that there should be a rather insensitive range of absolute level, which diminishes with increasing luminance and vanishes altogether in the levels found in full daylight outdoors; this accords with experience. The curves provide means for translating apparent brightnesses into luminance and vice versa. Figures of apparent brightness can be used to express the intentions of an architect in any interior, and they can then be translated into luminance.

A step which may be very important is the finding of a simple method of designing the installation to produce a required brightness pattern. It is shown that if the problem is approached in the opposite direction from the usual one, starting with the apparent brightness and deriving the installation, the very complex mechanism can be negotiated simply, and interreflection theory avoided. This method has been tried in practice and has been found to be simple and to work well. It may be the beginning of a new approach to interior lighting.

If a small plane test plate is turned about into different orientations in an interior, its illumination generally varies, as a result of the spatial distribution of incident light. Thus a solid matt object displays a modelling pattern due to the interaction of its geometrical shape with this distribution. There is a modification or addition to the modelling pattern due to shadow, which arises when light from some part of the surrounding luminance field is cut off by an intervening opaque body. Thus the modelling pattern depends upon the spatial distribution of incident light, and the shadow pattern on the surrounding luminance field: this difference permits some freedom in producing shadow and modelling. In addition, there is a further modification of the pattern which occurs when the surfaces are not matt, due to the interaction of the geometry, the reflection characteristics and usually both the distribution of incident light and the surrounding luminance field.

Modelling effects have been studied by recording the appearance of a standard polyhedron structure, and by measuring the spatial distribution of incident light. Two characteristic patterns have been found, one of which is characteristic both of overcast daylight outdoors, and of most interior artificial light installations, and the other of which is characteristic of outdoor sunlight and of indoor daylight. The first shows little change of illumination with orientation in azimuth, but considerable change with altitude; the latter shows marked change in azimuth. Users prefer azimuth modelling, and do not consider altitude modelling to be "modelling" at all. Methods of expressing spatial distribution of incident light have been worked out and a modelling index devised

Annual Subscriptions

Notices that 1954 subscriptions to the I.E.S. are now due have been sent to members, and I should like to draw their attention to the advantages of paying their subscriptions as early as possible during the year and to making use of the banker's order-forms which were enclosed with the applications.

About 50 per cent. of members pay their subscriptions during the first weeks of the year; reminders are sent to the remainder in April, July and October. Each reminder brings in a new batch of subscriptions, but even so there are still some outstanding at the end of each year when the Council then has to take a decision to remove the names of the members concerned. Apart from the time involved these quarterly reminders cost money so that with each reminder the value of the member's subscription to the Society is less than it should be; for example if a member does not pay his subscription until the end of the year it has cost the Society something like half-a-crown to collect it and I estimate that it costs the Society £40-£50 a year to collect subscriptions which are not paid within the first three months of the year. This is money which could be used for other things as also could the time spent by the office staff in sending out these reminders.

Members who do not pay their subscriptions at once intend to do so sometime as they do not wish their membership of the Society to lapse; completion of a banker's order would save them trouble and the Society would not have to send them the notice on January 1 or subsequent reminders—to the relief of both members and office.

It would be a great help to the office and to the Society as a whole if members could co-operate as I have suggested.

G. F. COLE,
I.E.S. Secretary.

which appears to accord with experience; experiments have been made to determine the modelling index corresponding to describable degrees of modelling. The bearing of modelling upon the designs of lighting installations is explored and possible methods are discussed for achieving it.

Emphasis is a more elusive quantity. In some respects it is catered for in the design of the pattern of apparent brightness; but modelling, shadow contrast and colour difference all contribute to it. Inasmuch as the means adopted to produce emphasis by apparent brightness are likely also to involve the shadow modelling and contrast, and in some cases the colour, it is difficult to isolate the ingredients of emphasis. No numerical basis for emphasis is put forward, but work on it is in hand.

The work described may provide new means whereby the designer can express and realise his purpose; but they will not provide the purpose. Purpose in the design of an interior involves the architecture, the decoration, the furnishing and the lighting, and unless they are harmoniously combined in a common and clear architectural purpose, refined design of any of them is pointless. Here the lighting engineer must turn to the architect for help, for the problem is in his field; and if he will state clearly the effects he wants, we may now be better able to set out to achieve them.

Sussex Group

Some 31 members and friends attended an open meeting of the Sussex Group, held on Thursday, December 10, 1953, at the Electricity Showrooms, Grove-road, Eastbourne, when Mr. H. C. Weston gave a talk on "The Basis of the I.E.S. Code." The talk was illustrated by lantern slides and it was evident from the discussion that followed the audience had thoroughly enjoyed themselves.

The chairman of the meeting, Mr. N. Boydell, manager, East Sussex and South West Kent Sub-Area, South Eastern Electricity Board, thanked Mr. Weston for his excellent talk and also for the effort he had made in travelling a considerable distance in very inclement weather conditions.

Nottingham Centre

An extra Sessional Meeting of the Nottingham Centre took place on November 26 when three short films were presented. Two of these were American and entitled "Dawn of a Better Living" and "Light Control Through Polarisation." The former showed a brief history of lighting and how the use of electricity improved the lot of man whilst the latter showed the various uses which such light could be put to. The third film dealt with underwater photography.

On December 3, Mr. E. Morgan, Assistant Director of Research for British Railways, presented a paper on "Some Problems in Railway Lighting" to a large and representative audience. He explained the many difficulties which have to be overcome, particularly those resulting from atmospheric pollution in engine sheds, the lighting of marshalling yards and the loading of freight trains. A film showing the wear on rails taken from underneath a train in motion created considerable interest.

The discussion which followed was opened by the chairman of the centre and the vote of thanks was proposed by Dr. A. Roberts.

Birmingham Centre

On Friday, December 4, Mr. E. F. Martin gave a lecture to the Birmingham Centre on "Illuminated Signs." Mr. Martin opened his talk by referring to the number of controls imposed on this type of lighting and the constant fight which was being waged by the Electrical Sign Manufacturers' Association.

Dealing with the purposes and uses of illuminated signs Mr. Martin said they were employed for a variety of uses, to be informative or directional, for prestige purposes, for advertising goods or service, or for sheer publicity. They can also be used for purely decorative purposes or for special occasions.

The lecturer said that 90 per cent. of the illuminated signs erected were neon signs. The red illuminating tube was the only true neon tube employing neon gas within clear glass. A vast range of colours, however, was now available and the colour effects were obtained by the mixture of different gases and different applications of fluorescent powders to the inside of the tubing. Thus it was possible to have a range of colours, including white, various shades of blue, orange, yellow, pink, green and so on.

A neon tube provided only the source of illumination and did not, except in rare cases, constitute a complete display in itself. Mounting the tubing on various types of background served the double purpose of providing a reasonable and attractive daylight appearance and, at the same time, concealed electrodes and equipment.

Mr. Martin made the interesting observation of the way in which colours became associated with names and trades. He gave the example of a person whose name was Green never using that colour in any of his lighting schemes. On the other hand certain trades lent themselves to certain colours; for example, white or blue was invariably used by ice-cream and refrigeration manufacturers because of the cold association of these two colours. Conversely, coal merchants, manufacturers of electric fires and grates used the warmer range of colours, reds, oranges and pinks. Again, for obvious reasons, undertaking establishments usually adopted a subdued blue. Unfortunately, flashing devices could not be used in anything like the number of ways formerly associated with the early displays of tungsten lamps. This was not too bad, however, because many authorities regarded flashing devices as a danger and distraction to road users.

Glasgow Centre

At the Glasgow Centre meeting on December 4 Mr. W. J. Vine and Mr. Passmore read a paper on the "Dimming of Fluorescent Lamps." The lecturers dealt with the introduction in 1950 of fluorescent dimming circuits and their development since then. New and simplified equipment for applications not requiring fine control was demonstrated. The economics of tungsten and fluorescent circuits were dealt with. The greater colour stability at all light levels was emphasised.

Applications illustrated included outdoor and garden lighting, and the floodlighting of building exteriors, theatre lighting and interior lighting.

The lecture was illustrated by slides and a large array of demonstration equipment including a fitting and a bare lamp circuit immersed in water. The discussion was lively and the many interested visitors posed questions.

Forthcoming I.E.S. Meetings

LONDON

February 9th

Sessional Meeting. "Flameproof Lighting," by D. A. Strachan. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

March 9th

Sessional Meeting. "Flicker in Relation to Interior Lighting," by J. B. Collins and R. G. Hopkinson. (At the Lighting Service Bureau, 2, Savoy Hill, W.C.2.) 6 p.m.

CENTRES AND GROUPS

February 2nd

CARDIFF.—"Colour and Dress Display." (At the South Wales Electricity Board's Demonstration Theatre, The Hayes, Cardiff.) 5.54 p.m.

February 3rd

EDINBURGH.—"The Lighting of Modern Ocean Liners," by T. Catten. (At the Conference Room, Manor Club, 12, Rothesay Place, Edinburgh, 3.) 7 p.m.

NEWCASTLE.—"Light and Other Radiations in the Detection of Crime," by C. H. Edlin. (At the Roadway House, 8, Oxford Street, Newcastle-upon-Tyne, 1.) 6.15 p.m.

SWANSEA.—"The Architect's Appoach to Artificial Lighting." (At the Minor Hall, Y.M.C.A., Swansea.) 6.30 p.m.

February 4th

GLOUCESTER AND CHELTENHAM.—"The Electrical Installation in a Nylon Yarn Factory," by B. C. Robinson. (At the General Electric Co., Ltd., 2, St. Aldgate Street, Gloucester.) 6.30 p.m.

NOTTINGHAM.—"Natural and Artificial Lighting in Factories," by W. H. Allen. (At the Demonstration Theatre of the East Midland Electricity Board, Smithy Row, Nottingham.) 6 p.m.

February 5th

SWANSEA.—Annual Dinner and Dance.

February 8th

SHEFFIELD.—"Lighting in the Design of Schools," by A. Pott. (At the Medical Library, The University, Western Bank, Sheffield, 10.) 6.30 p.m.

February 10th

HUDDERSFIELD.—"Lighting for Enjoyment," by T. O. Freeth. (At 19/23, Northgate, Halifax.) 7.30 p.m.

February 11th

MANCHESTER.—"Lighting for Enjoyment," by T. O. Freeth. (At the Demonstration Theatre of the North-Western Electricity Board, Town Hall Extension, Manchester.) 6 p.m.

February 14th

GLASGOW.—"Discussion on Street Lighting," by J. M. Ward and F. N. Rush. (At the Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow, C.2.) 6.30 p.m.

February 16th

LIVERPOOL.—"The Application of Fluorescent Tubes in Transport Lighting," by S. Anderson. (At the Merseyside and North Wales Electricity Board's Service Centre Lecture Theatre, Whitechapel, Liverpool.) 6 p.m.

February 17th

NORTH LANCASHIRE.—"A Short Investigation into Stroboscopic Effect," by E. Smith. (At the Demonstration Theatre of the North-Western Electricity Board, 19, Friargate, Preston.) 7.15 p.m.

TEES-SIDE.—"Airport Lighting," by H. M. Ferguson. (At the Cleveland Scientific and Technical Institution, Corporation Road, Middlesbrough.) 6.30 p.m.

February 22nd

LEEDS.—"Fashion and Creative Photography in Advertising," by J. Short. (At the Lecture Theatre of the Lighting Service Bureau, 24, Aire Street, Leeds, 1.) 6.15 p.m.

LEICESTER.—"Light, Colour and the Stage," by A. G. H. Tuxford. (At the Demonstration Theatre of the East Midlands Electricity Board, Charles Street, Leicester.) 7 p.m.

February 26th

BATH AND BRISTOL.—"Black Light—Its Effect and Applications," by R. V. Mills. (At the South-Western Electricity Board Lecture Theatre, Old Bridge Street, Bath.) 7 p.m.

BIRMINGHAM.—Annual General Meeting. "Illumination from the Ophthalmic Standpoint," by W. J. Wellwood Ferguson. (At "Regent House," St. Phillip's Place, Colmore Row, Birmingham.) 6 p.m.

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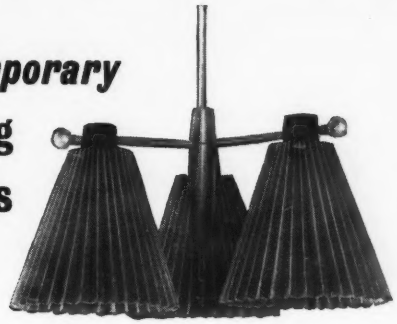

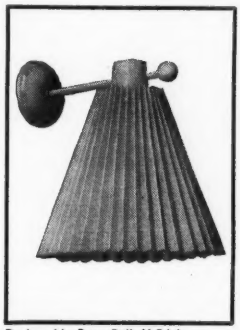

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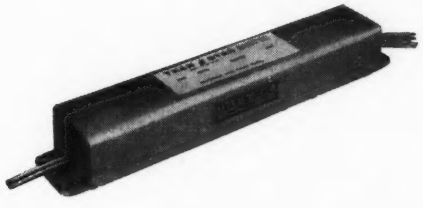

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POSTSCRIPT By "Lumeritas"

From January 1 the use of flashing signal lamps on motor-cars has been legalised, and I am wondering whether those motorists who have hastened to condemn flashing beacons at pedestrian crossings will now protest, just as emphatically, against the potentially great increase in the number of blinking lights road users will encounter. I have already defended the flashing beacons, and still do so, but I am not yet satisfied that flashing direction indicators on cars will prove so satisfactory as the illuminated semaphore arms with which we have become so familiar. Of course, the use of these familiar indicators remains legal practice, and all that has happened is that flashing lights—similar to those commonly used in America—are now a permissible alternative. My doubt about the efficacy of the new direction indicators is not because they blink, but because they are commonly—although not necessarily—mounted below eye level to such an extent that they may be concealed from the driver of a closely following vehicle, and may also escape the notice of pedestrians. So far, however, the only reaction I know of to the prospect of more blinking lights (apart from an amusing cartoon in the London "Evening News") comes from the Association of Optical Practitioners, who are so concerned about the combined effects of blinking beacons, winking direction indicators, and flashing roadside neon signs that they are reported to be going to ask the Ministry of Transport to consider limiting the number of flashing neon signs on buildings close to traffic lights. There may, of course, be a case for such restriction in some localities, just as static lights, e.g., H.P.M.V. street lights, sometimes have to be screened if there is any risk that they may be "misread" as railway signal lights. Where a flashing beacon is a serious nuisance to the inmates of nearby houses it is permitted to screen it in the direction of the buildings, and a doctor in Oldham has recently complained about penetration of the light from a sodium street lantern outside his house, so that a special shade is to be fitted to this lantern to cut off the light in the direction of his house.

Some interesting results have come out of tests made by the Lighting Service Bureau to find the preferred colour quality of light for illuminating various classes of goods in shops. I understand that a panel of judges, drawn from people who sell the selected goods, were shown displays illuminated by different light sources which were not disclosed to the judges until they had reached a verdict based only on the appearance of the goods. Except for cheese and uncut bacon, the light chosen as most suitable for foodstuffs was always that of filament lamps either alone or combined with fluorescent tubes usually of the colour-matching type. For cheese, colour-matching fluorescent tubes alone were chosen and, for uncut bacon, mellow fluorescent. However, the choice was much the same for goods other than foodstuffs, that is to say, filament lamps combined with colour-matching fluorescent tubes, or filament lamps alone, were chosen almost invariably. My impression is that many "natural" fluorescent tubes are actually installed in shops selling a number of the goods used in the L.S.B. tests, yet these tubes never appealed to the panel of judges, even as a second choice. Other lamps which were "not placed" were the daylight fluorescent and—not surprisingly—the H.P.M.V.

There are differences of opinion on so many matters that it is a little surprising to find one on which there appears to be general agreement. Judging, however, from the letters which are published in national and local newspapers on street lighting, it seems to be generally agreed that improvement is necessary, even though there is controversy about illuminants and methods of street lighting. As to illuminants, I commented last month on the growing use of sodium lighting, but there is no lack of objectors to the use of sodium for public lighting where roads traverse areas having beautiful historic buildings or natural scenic beauty. One correspondent from Norwich advocates the use of this illuminant for danger spots on our roads, especially at pedestrian crossings—as was tried experimentally before flashing beacons were decided upon. Another Norwich correspondent suggests varying the illuminant according to the classification of roads—sodium lighting being the mark of Class A roads. Notwithstanding its relatively high capital cost, fluorescent lighting for streets is making headway, not only here but also, apparently, in the United States. The "Illustrated London News" recently published a picture of "the longest dinner table in the world," which stretched the length of a street in Culpeper, Virginia, where the citizens were celebrating the installation of fluorescent lighting!

As to the cost of street lighting, although I usually pay my rates as reluctantly as most people, and without looking into the ways in which my money is spent, curiosity recently prompted me to examine the analysis given by my urban district council on the back of their unwelcome demand note. The general rate is apportioned to 26 services, and public lighting comes thirteenth in point of cost. Apparently I pay 12 times as much in the pound for enlightening the minds of the young generation as I do for illuminating the streets. For the latter the rate is 8.35 pence in the pound, yet there is only one road in the district which has a first-class lighting installation, and that is a by-pass road which does not need it! The lighting of the main street would do no credit to a "one-horse" town, other much-used roads are poorly lighted, and the few pedestrian crossings still have no illuminated beacons. There are many other districts no better, or not so well, served, but while I am no more anxious than other people to pay higher rates, I do want better street lighting. A 2½ per cent. reduction in the disproportionate rate taken by the county council for education would enable my U.D.C. to increase the sum spent locally on public lighting by 25 per cent.